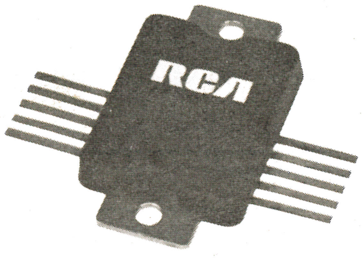
RCA
Solid State
Division

Power Circuit Modules
HC1000

File Number **461**

Multi-Purpose, All-Silicon 7-Ampere Power Amplifier

Linear Amplifier for Applications in Industrial and Commercial Equipment



(Approx. 1/3 Actual Size)

H-1637

Features:

- **Bandwidth: 30 kHz at 60 W**
- **High power output: up to 100 W(rms)**
- **High output current: 7 A (peak)**
- **Built-in load-line limiting circuit to protect amplifier from accidentally short-circuited output terminals**
- **Stability with resistive or reactive loads**
- **Reactive-load fault protection**
- **Single or split power supply (30 to 75 V, total)**
- **Provision for gain control**
- **Direct coupling to load**
- **Class B output stage**
- **Rugged package with heavy leads**
- **Light weight: 100 grams**

RCA type HC1000* is a complete solid-state hybrid amplifier in a compact molded-epoxy plastic package.

The HC1000 employs a quasi-complementary-symmetry class B output circuit with built-in load-fault protection and hometaxial output transistors. This circuit may be operated from a single or split power supply.

Type HC1000 is recommended for the following applications: servo amplifiers (AC, DC, PWM); deflection amplifiers; power operational amplifiers; audio amplifiers; voltage regulators, and driven inverters.

MAXIMUM RATINGS, *Absolute-Maximum Values:*

SUPPLY VOLTAGE:	
Between leads 1 & 10	75 V
OUTPUT CURRENT (Peak)	7 A
TOTAL DISSIPATION:	
Per Output Device	See Fig. 4 & 5
TEMPERATURE RANGE:	
Storage	−55 to +125°C
OUTPUT JUNCTION	−55 to +150°C
LEAD TEMPERATURE (During Soldering):	
At distance ≥ 1/8 in. (3.17 mm) from case for 10 s max.	235°C

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* Formerly RCA Developmental Type TA7625.

CAUTION: WITH A SINGLE-SUPPLY SETUP, AN ACCIDENTAL SHORT CIRCUIT FROM LEAD 4 TO GROUND COULD RESULT IN MODULE DAMAGE. HOWEVER, THE BUILT-IN LOAD-LINE LIMITING NETWORK WILL PROTECT THE MODULE IF A SHORT CIRCUIT OCCURS BETWEEN LEADS 4 & 5.

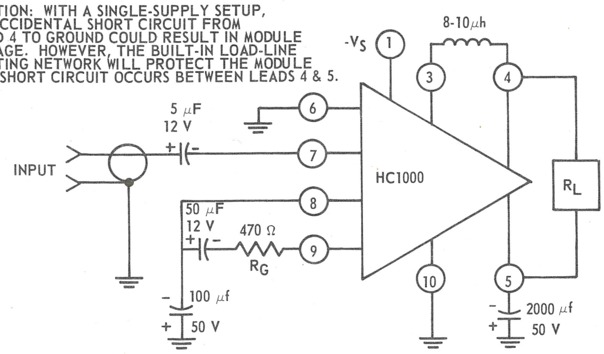
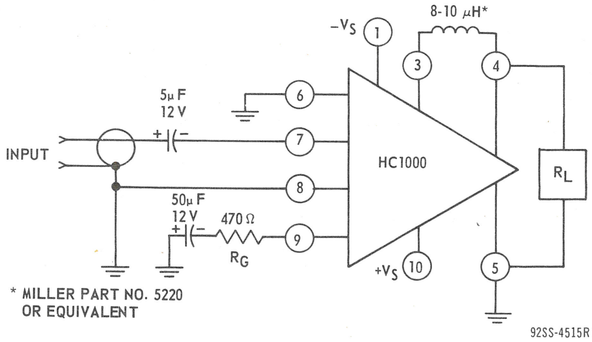


Fig.1 — Type HC1000 power circuit module with external connections for operation with a single power supply.



* MILLER PART NO. 5220
OR EQUIVALENT

Fig. 2 — Type HC1000 power circuit module with external connections (& split power supply) for measuring relative response & distortion; see Fig.8 & 9.

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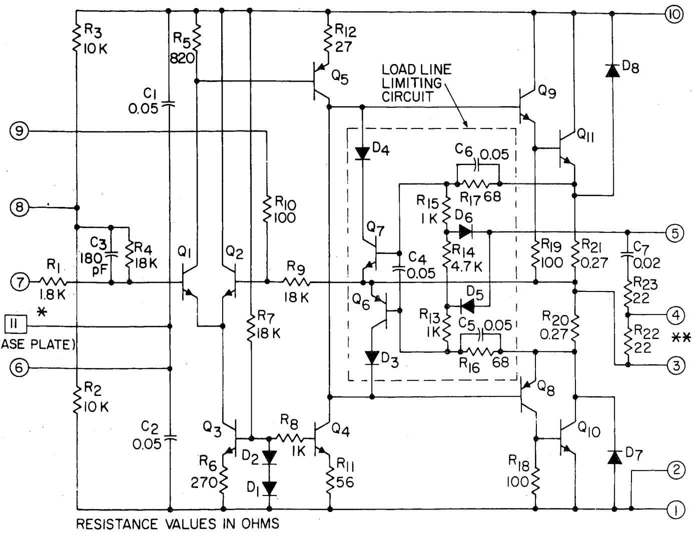
ELECTRICAL CHARACTERISTICS, At Case Temperature (T_C) = 25°C

CHARACTERISTIC	SYMBOL	TEST CONDITIONS				LIMITS			UNITS
		SUPPLY VOLTAGE (V_S)–V	FREQ. (f)–kHz	OUTPUT POWER (P_O)–W	LOAD RESIST. (R_L)–Ω	MIN.	TYP.	MAX.	
Voltage Gain (See Fig.2)	$\frac{V_{OUT}}{V_{IN}}$	±37.5	1	1	4	28	30	–	–
Input Impedance Measured between leads 7 & 8 (See Fig. 2)	Z_{IN}	–	–	–	0	16	18	–	kΩ
Quiescent Current	I_o	±37.5	–	–	–	15	–	30	mA
Offset Voltage Measured between leads 4 & 5 (See Fig. 2)	V_{offset}	±37.5	–	–	4	0	±75	±250	mV
Bandwidth (See Fig. 2 & 8)	f_H	±37.5	–	1	4	43	–	–	kHz
Total Harmonic Distortion (See Figs. 2 & 9)	THD	±37.5	1	60	4	–	0.4	0.5	%
Short-Circuit Current (See Fig. 11)	I_S	±37.5	1	–	0	2	–	3	A
Signal-to-Noise Ratio Signal source impedance = 600 Ω	S/N	±37.5	–	–	–	–	+78	–	dB
Thermal Resistance Per Output Device (Junction-to-Case) (See Figs. 4 & 5)	$\theta_{J\text{-}C}$	–	–	–	–	–	–	2	°C/W



RESISTANCE VALUES IN OHMS
CAPACITANCE VALUES IN MICROFARADS
UNLESS OTHERWISE SPECIFIED

* BASE PLATE/MOUNTING FLANGE; SEE DIMENSIONAL OUTLINE

**CAUTION: THE EXTERNAL DC RESISTANCE BETWEEN LEADS 3 AND 4 MUST BE MAINTAINED AT 0.5 Ω OR LESS IN ORDER TO PROTECT R_{22} FROM EXCESSIVE DISSIPATION AND POSSIBLE DAMAGE. CARE SHOULD BE TAKEN TO INSURE GOOD ELECTRICAL CONNECTIONS TO LEADS 3 AND 4

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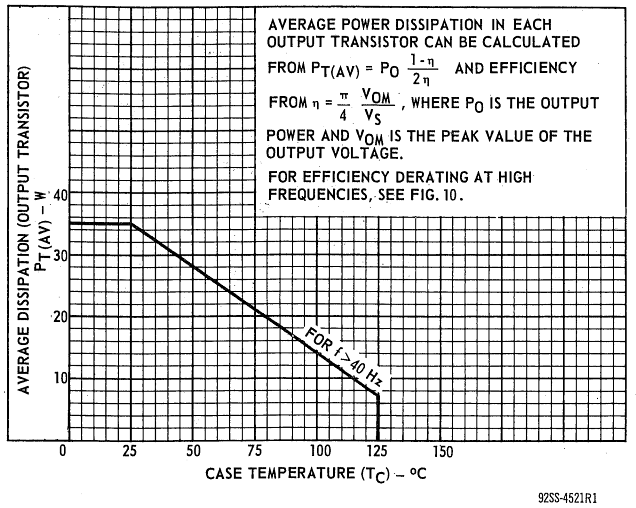
Fig. 3 – Schematic diagram of type HC1000 power circuit module.



AVERAGE POWER DISSIPATION IN EACH OUTPUT TRANSISTOR CAN BE CALCULATED FROM $P_{T(AV)} = P_O \frac{1-\eta}{2\eta}$ AND EFFICIENCY FROM $\eta = \frac{\pi}{4}\frac{V_{OM}}{V_S}$, WHERE P_O IS THE OUTPUT POWER AND V_{OM} IS THE PEAK VALUE OF THE OUTPUT VOLTAGE.

FOR EFFICIENCY DERATING AT HIGH FREQUENCIES, SEE FIG. 10.

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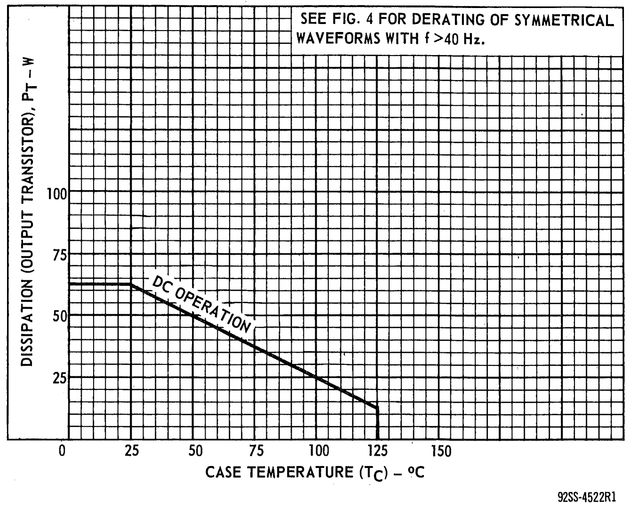
Fig. 4 – Dissipation (average) derating curve for each output transistor in type HC1000 (for symmetrical waveforms with f > 40 Hz).



SEE FIG. 4 FOR DERATING OF SYMMETRICAL WAVEFORMS WITH f > 40 Hz.

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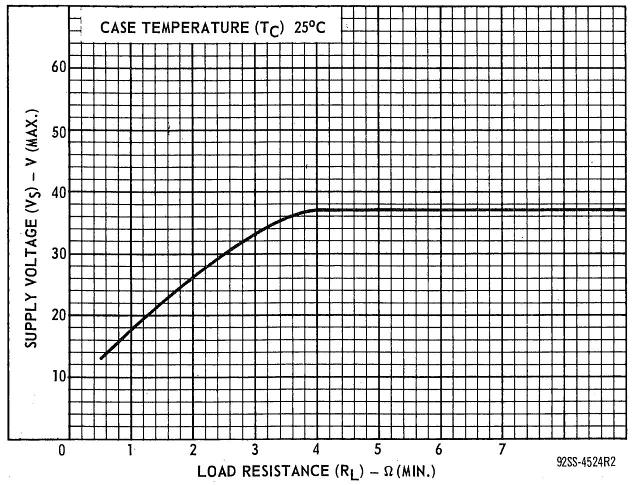
Fig. 5 – Dissipation (DC) derating curve for each output transistor in type HC1000.



CASE TEMPERATURE (T_C) 25°C

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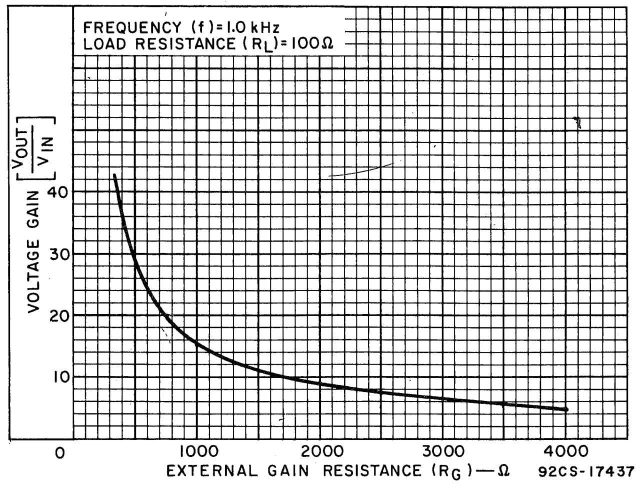
Fig. 6 – Maximum allowable supply voltage vs. load resistance for type HC1000.



FREQUENCY (f) = 1.0 kHz
LOAD RESISTANCE (R_L) = 100 Ω

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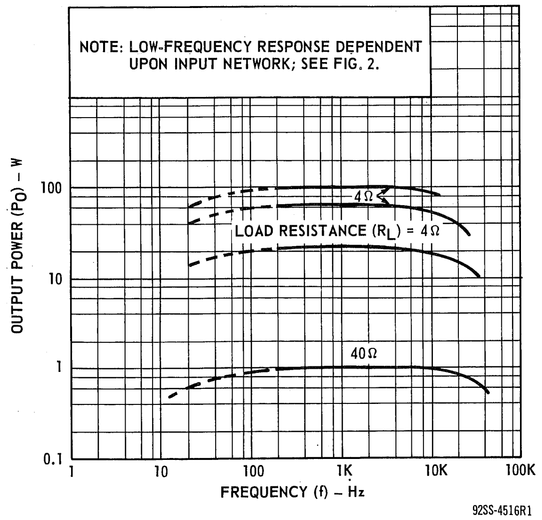
Fig. 7 – Voltage gain vs. external gain resistance for type HC1000.



NOTE: LOW-FREQUENCY RESPONSE DEPENDENT UPON INPUT NETWORK; SEE FIG. 2.

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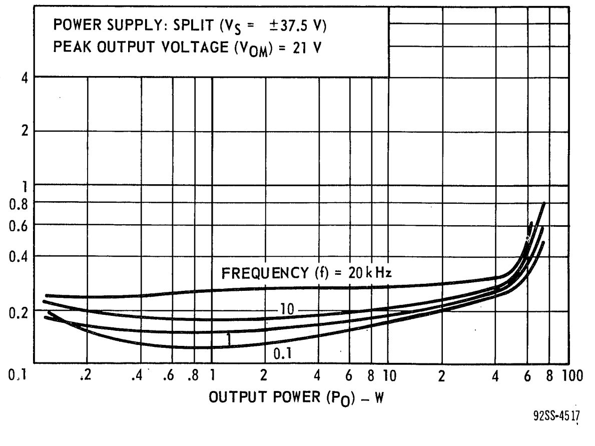
Fig. 8 – Output power vs. frequency for HC1000.



POWER SUPPLY: SPLIT (V_S = ±37.5 V)
PEAK OUTPUT VOLTAGE (V_{OM}) = 21 V

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Fig. 9 – Total harmonic distortion for HC1000 with split supply.

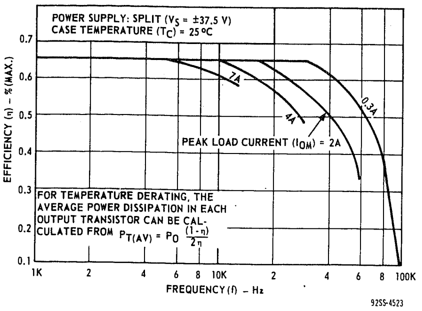


Fig. 10 – Maximum efficiency vs. frequency for type HC1000 for several values of peak load current.

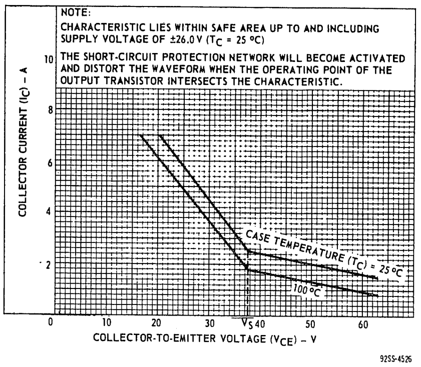


Fig. 11 – Characteristics of built-in load-line limiting circuit for type HC1000.

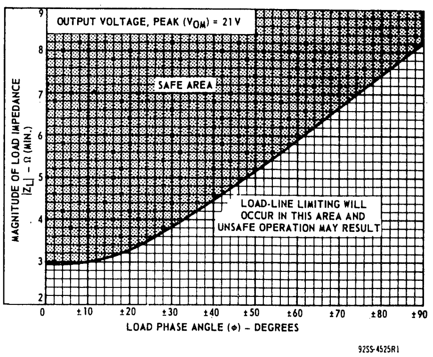


Fig. 12 – Minimum load impedance vs. load phase angle and safe area of operation for type HC1000.

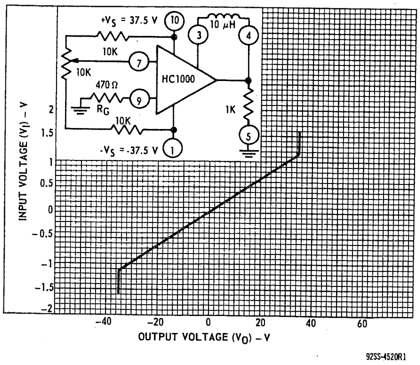


Fig. 13 – Gain linearity characteristic of type HC1000.

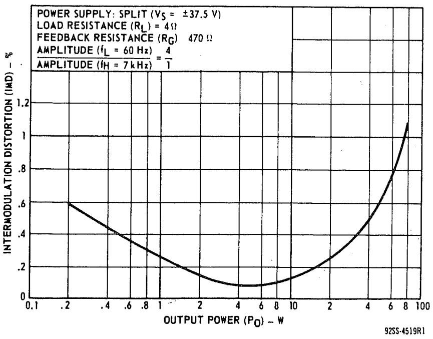


Fig. 14 – Intermodulation distortion for HC1000 with split supply & 4–Ω load.

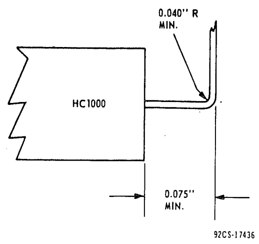
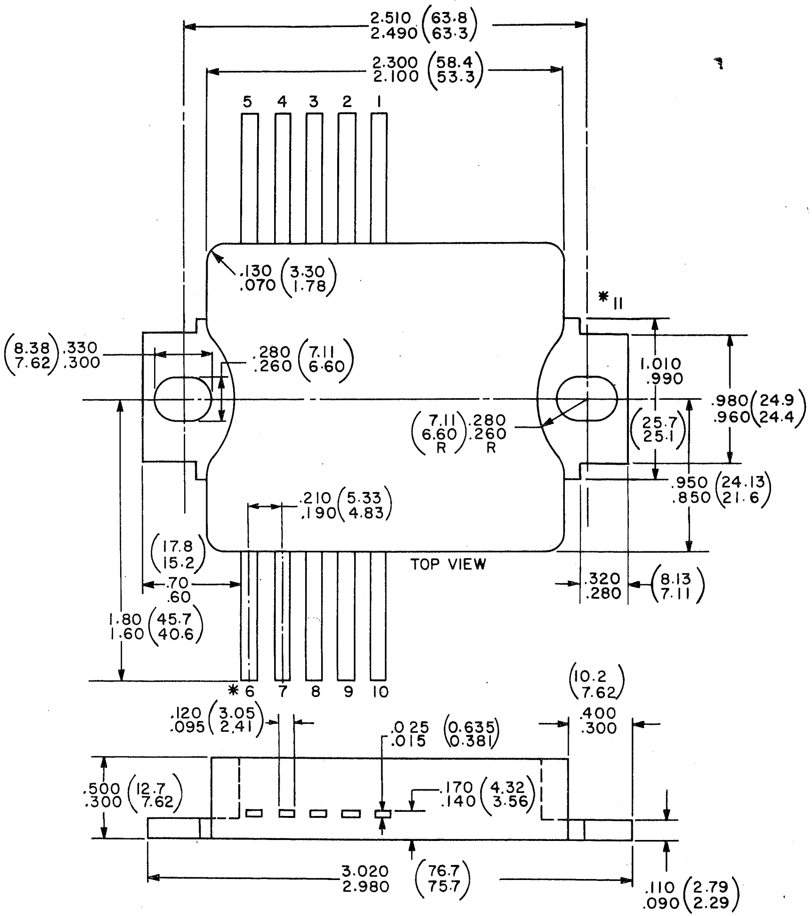


Fig. 15 – Recommended lead-bending specification for type HC1000.

DIMENSIONAL OUTLINE



* TERMINALS 6 AND 11 ARE CONNECTED INTERNALLY

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Dimensions in inches and millimeters (values in parentheses).